The VIME Image Database

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VIME Charter

VQEG formed the VIME (Video and Image Models for consumer content Evaluation) workgroup at its meeting in Stockholm in July of 2014. VIME's charter is to address the problem of no-reference quality assessment of consumer images. Attention is drawn to the terms "*consumer images*" and "*no-reference*".

> "VIME's charter is to address the problem of no-reference quality assessment of consumer images. Attention is drawn to the terms *consumer images* and *no-reference*."

Consumer images are images captured by a consumer device such as a mobile phone, tablet, compact camera, digital single-lens reflex (DSLR) camera, or other type of camera available to a consumer. Thus, VIME addresses distortions introduced by the camera capture process and post-processing (not just compression artifacts), using real-world images taken with digital cameras and smartphones.

"No-reference quality assessment" refers to the problem of evaluating the quality of an image in the absence of a pristine or perfect version of that image. The no-reference paradigm bypasses the need to compare against a reference and performs the image quality evaluation on the test image with no additional ancillary information. In most practical usage such reference is not available. In the case of photography, such notion of reference does not exist, especially when considering aesthetics. The evaluation is based only on the intrinsic features of the test image.

The goals and differentiations from past no-reference image quality work are summarized by the following points:

"VIME is currently collecting images to build a large dataset of photos that can be used to conduct its research work.
… VIME is making this dataset freely available to the research community."

- VIME considers distortions introduced by camera capture and processing (not only compression artifacts) using real-world and natural images taken with digital cameras and smartphones.
- VIME addresses no-reference and aesthetic quality of images and videos.
- VIME addresses image enhancement, i.e. there is no concept of pristine reference image as the processed image can be of higher image quality than the starting image.

Further information can be found on the VIME project website at: http://www.its.bldrdoc.gov/vqeg/projects/vime.aspx.

Subjective studies are central to understanding the human visual response to image quality, and image data sets with corresponding subjective scores are key to image quality model development and test.

VIME is currently building a dataset of photos that can be used to conduct its research work. Although many images exist on the internet, most image datasets available on the web do not meet the needs of VIME. Dedicated to the goal of no-reference image quality model development, the VIME workgroup began the project of creating an open data set of images for use in the VIME research.

A Flickr group called the *VIME Image Database* was created at https://www.flickr.com/groups/vime/. The aim of the Flickr group is to create a dynamically growing data set of images that will eventually be used for subjective testing and model design. People are invited to contribute images to the database under the CC0 license (Public Work Dedication license).

The dataset contains more than 1,100 images to date and is constantly growing.

VIME is making this image dataset freely available to the research community.

Subjective Image Quality Evaluation

Objective model development typically relies on subjective quality evaluation studies for two reasons: 1) to understand the psychophysical response consumers have to image quality; and 2) to use the subjective data produced for model development and model performance evaluation.

The studies in [1] and [2] have begun to address the need for consumer-like images with associated subjective scores for the purpose of no-reference quality evaluation model development. In most previous traditional studies the images used for subjective testing consisted of reference images with versions of them that contain varying degrees of simulated distortions such as blur, additive noise, or compression and transmission artifacts. In contrast, the studies in [1] and [2] emphasize the need for datasets of images with non-simulated distortions; that is, images with real artifacts that are representative of the type of photos seen by consumers. These studies emphasize the need for subjective quality evaluation of images as they are produced by consumer devices.

While these studies are an important step towards building datasets of representative consumer content, the number of scenes in these datasets is limited. On the other hand, the space of consumer images is large, complex, and requires understanding the camera response in a multitude of real life scenarios. To better understand the camera response, the larger the corpus of consumer images available to researchers, the better. The need for a large set of consumer images has motivated the creation of the dynamically growing VIME Image Database which we describe in the following section.

VIME Image Database: Goal

The VIME Image Database was created shortly after the VQEG face-to-face meeting in Santa Clara, California in February of 2015. The goal of this data set is multifold:

1) To create a dataset of images that are freely available for anyone to use with no licensing issues. The images of the VIME Image database are hence all under the CC0 (Public dedication work) license.
2) To create a dataset of images that are representative of the types of images consumers capture. These are images that are captured with mobile devices, compact cameras, and higher end cameras such as DSLR on a regular basis.
3) To gather a large set of images to be used in subjective studies to examine and address questions related to consumer image quality. There are a number of unanswered questions that the VIME group has begun to address. This dataset is expected to provide images for use in such studies.
4) To use the large corpus of images for no-reference objective image evaluation model development and performance evaluation.

The VIME Image Database is a dynamically growing set of photos that will increase in size as people continue to contribute photos to it.

How to Contribute and Upload Photos to the VIME Image Database

VIME has setup a Flickr Group called "**VIME Image Database**". Everyone is invited to contribute by uploading images to this image collection. People already using Flickr can contribute their images right away. For those not so familiar with Flickr, here are a few simple steps to follow.

You will need to:

- Have or create a Flickr account

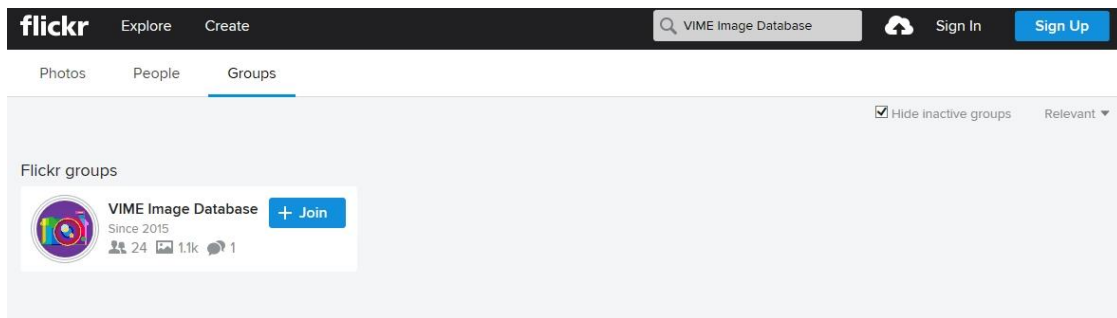- Join the VIME Image Database group to upload and share your images with the VIME group

Figure 1: The VIME Image Database can be found by searching for it in the "Groups" tab.

Here are some typical examples of how you can contribute to the VIME image dataset:

- Upload a single image: the image can be of any quality and photographic skills
- Upload several images of the same scene captured by different cameras
- Upload several images of the same scene captured by the same camera using different capture settings (e.g. shutter speed, aperture, ISO) or using different lenses

You are required to **upload your images under the CC0 license (Public Work Dedication**). This ensures that VQEG and the entire research community can use and exchange the images without any legal issues. This requirement ensures that this image dataset is freely available to the entire research community.

There are currently no specific requirements on scene content, resolutions, or aspect ratios. However, it is recommended that you upload the highest resolution available for your image.

There are no requirements concerning the image quality and level of photographic skills. VIME is interested in images that have good photographic quality as well as images that have bad photographic quality.

To contribute your images, follow these simple steps:

- Sign in to your Flickr account or create a Flickr account if you don't have one.
- Search for "VIME Image Database" in Groups, as shown in Fig. 1, and join.
- Share your photos with the VIME Image Database group using one of the following two options:
  - Share new photos with VIME when you upload them for the first time to your Flickr account, or
  - Share existing photos in our Flickr account with VIME.

Option 1: Upload New Photos and Share them with the VIME Image Database

This will allow you to immediately share the photos that you are uploading to your account with VIME.

- Go to your account homepage click on "Upload" to add a new image to your own collection. See Fig. 2.

Figure 2: Click on "Upload" at the top right hand side corner of your account homepage.

- Add a description to your photos (Optional)
- Add tags, e.g. daytime, nighttime, indoor, outdoor, landscape, portrait, building, architecture, plant, forest, grass, rock, car,… This is shown in Fig. 3.
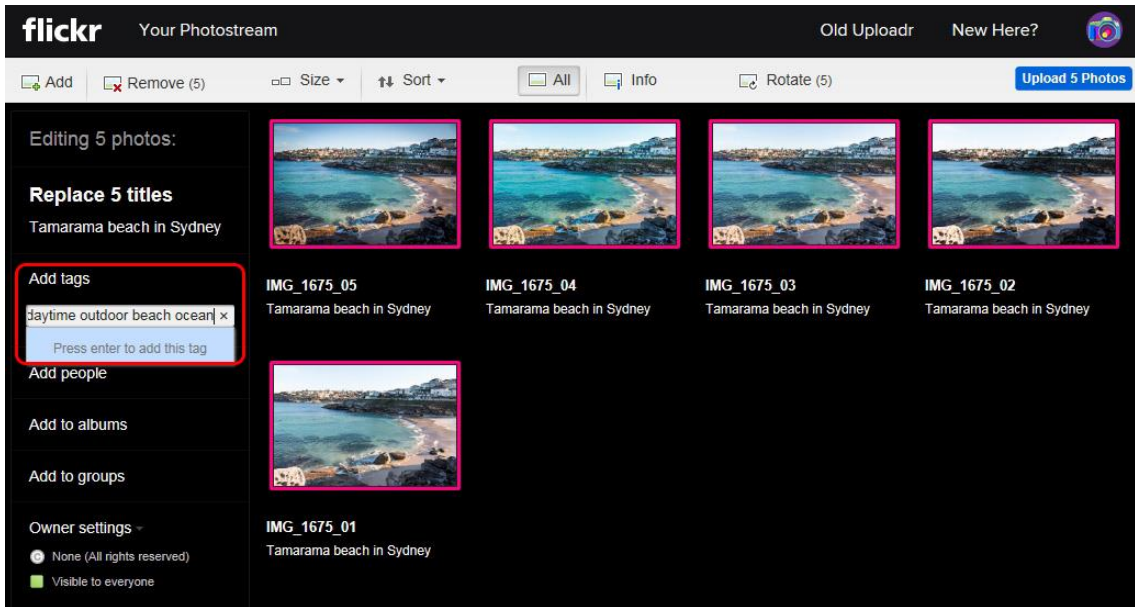
Figure 3: Adding tags to the photos.

- **Add to the VIME group**: Click on "Add to groups" and select "VIME Image Database" from the list of the groups you have joined as shown in Fig. 4.
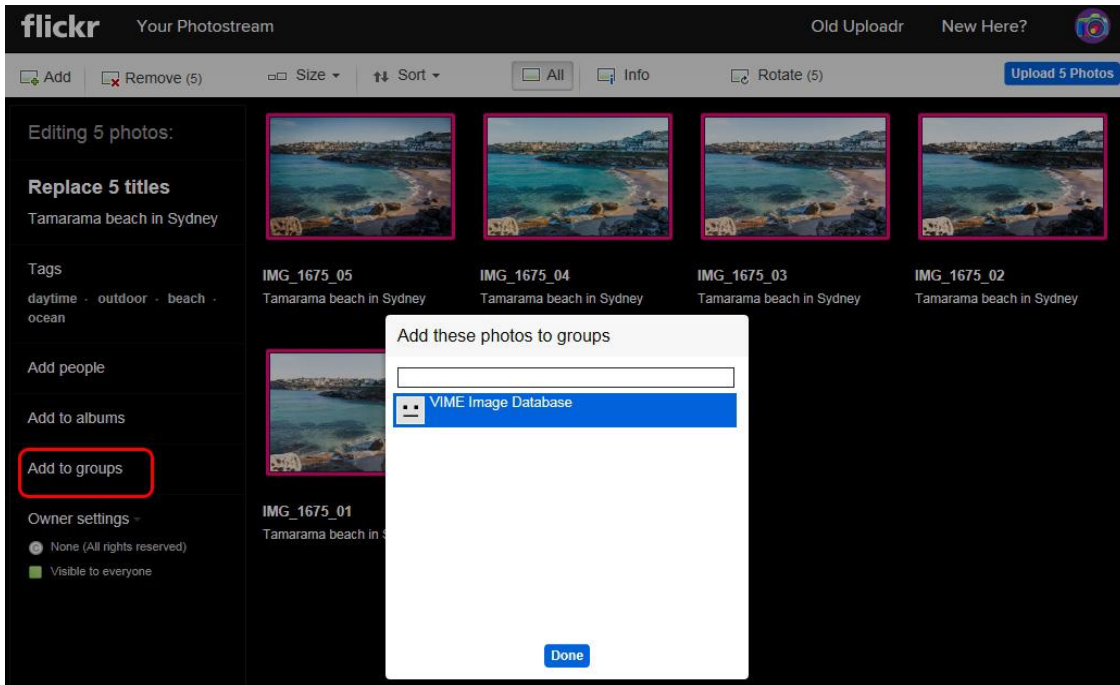

Figure 4: Add the photos to the VIME Image Database group.

- Set **Owner settings to CC0**: by default this setting is set to "None" so you need to change this setting to "Public Domain Dedication (CC0)" – Click 'done' after selection. This is demonstrated in Fig. 5. **This is important as your image will not be used in the VIME Image Database if its license is not set to CC0.**
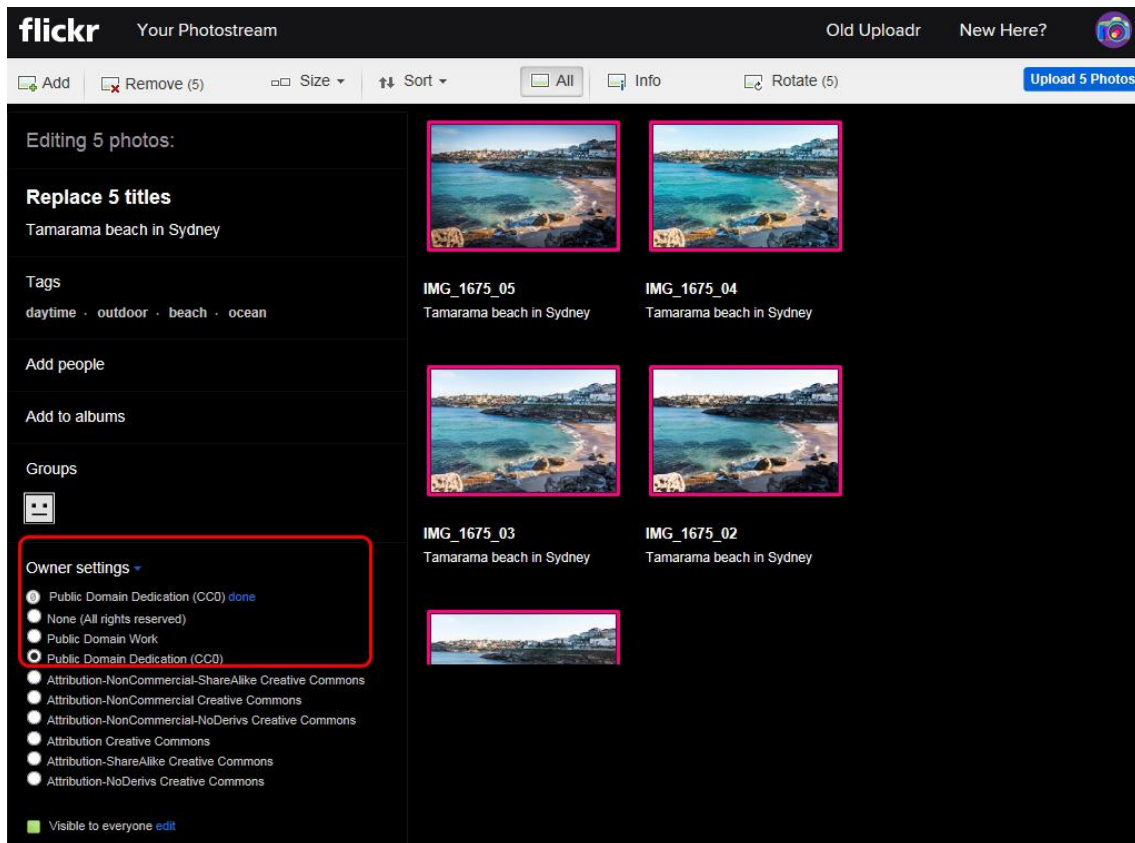

Figure 5: Set the photo licenses to CC0.

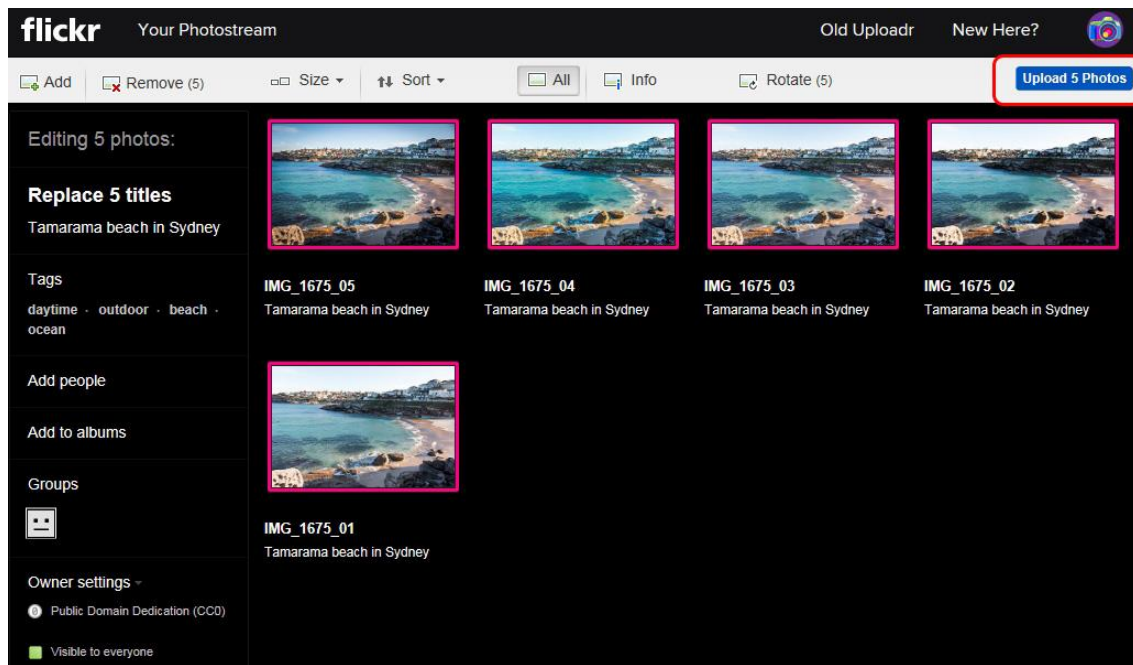- Upload Photos: click on "Upload" in top-right corner. (Fig. 6.)

Figure 6: Upload the photos.

Option 2: Share Existing Photos in your Account with the VIME Image Database

This will allow you to share a batch of photos that already exist in your Flickr account with the VIME Image Database.

- Go to the Menu You -> Organize (as in Fig. 7)
- Select all the photos you want to share with the VIME Image Database group
- Make sure you edit the settings similarly to Option 1:
  - Add to VIME Group
  - Set Owner settings to CC0
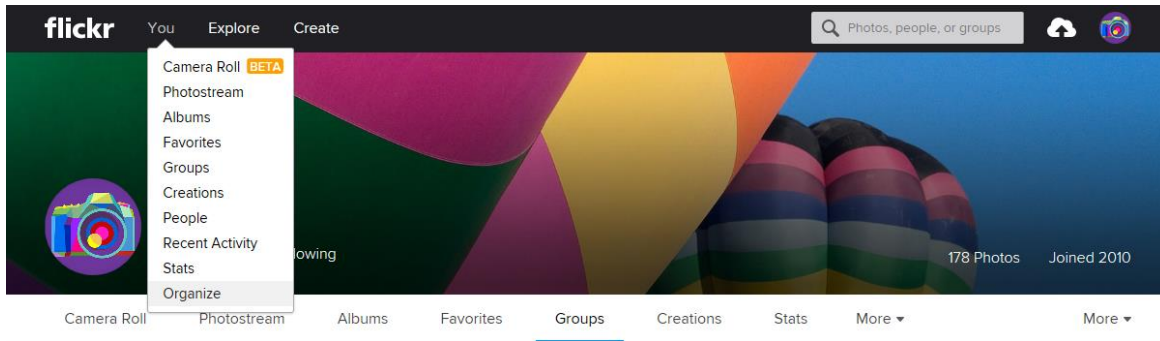 - Add tags
- Click "Send to Group"
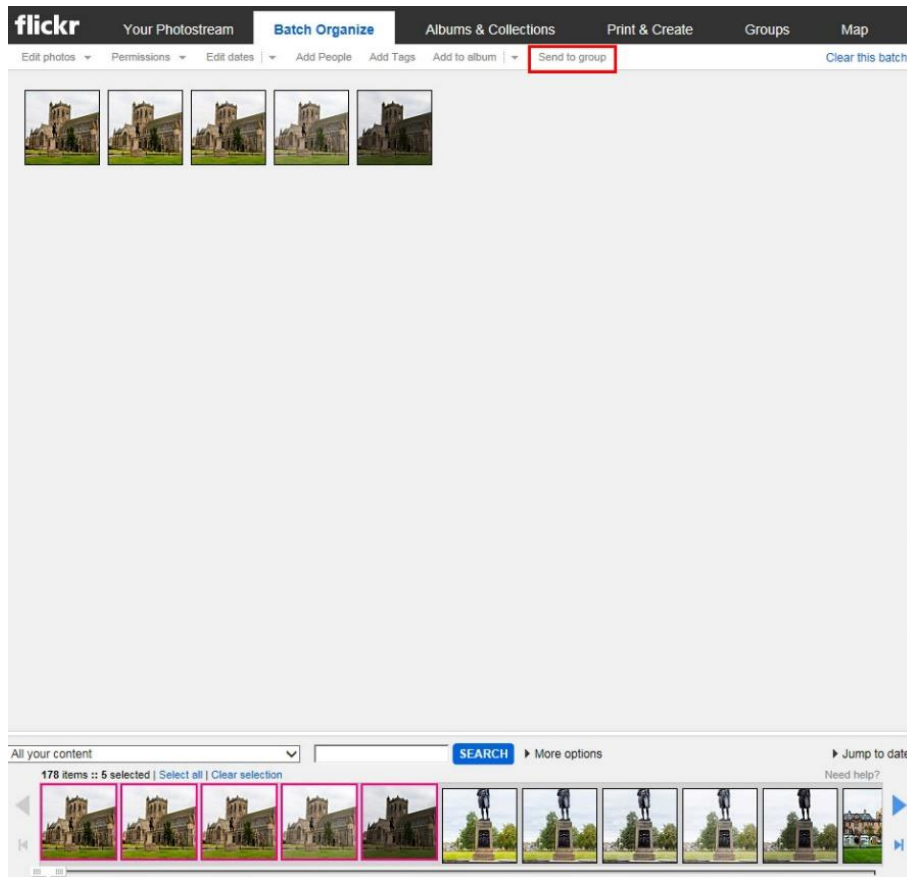
Figure 7: Go to "Organize" under the "You" menu.

Figure 8: Click "Send to Group" under in the "Batch Organize" tab.

References

[1] Virtanen, T., Nuutinen, M., Vaahteranoksa, M., Oittinen, P. and Häkkinen, J. "CID2013: a database for evaluating no-reference image quality assessment algorithms", *IEEE Transactions on Image Processing*, vol. 24, no. 1, pp. 390-402, Jan. 2015.

[2] M.A. Saad, M.H. Pinson, D.G. Nicholas, N. Van Kets, G. Van Wallendael, R. Da Silva, R.V. Jaladi, and P.J. Corriveau, "Impact of Camera Pixel Count and Monitor Resolution on Perceptual Image Quality", *IEEE Color and Visual Computing Symposium (CVCS)*, August 2015.

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